

with us.—T. KEELER-WOLF and V. KEELER-WOLF, 943 Aquarius Way, Oakland, CA 94611. (Received 10 Nov 82; accepted 6 Sep 83.)

CHROMOSOME NUMBERS AND CYTOGEOGRAPHIC PATTERNS IN *Claytonia perfoliata* AND *C. parviflora* (PORTULACACEAE).—Previous studies reported a euploid series from diploid to decaploid in the *Claytonia perfoliata* complex (Miller, Syst. Bot. 3:322–341, 1978). The purpose of this note is to report hitherto cytologically unknown populations of *C. perfoliata* Willd. and *C. parviflora* Hook. These chromosome numbers expand the known ranges of diploids, tetraploids, hexaploids, and decaploids and, in addition, provide interesting insight into phylogeographic patterns of the group. Vouchers for the following chromosome counts are deposited in OSC:

Claytonia perfoliata Willd. $2n = 12$ (as 6 bivalents): Mexico, Estado Baja California, Isla Guadalupe, Moran 25837-S₁; Estado Queretaro, Cerro Zamorano Ornduff 8583-S₁, U.S.A., Graham Co., AZ, Pinaleno Mts., Frye Canyon, Miller 802; Maricopa Co., AZ, Apache Trail at Fish Creek Canyon, Miller 878. $2n = 24$ (as 12 bivalents): Pinal Co., AZ, Santa Catalina Mts., Nugget Canyon e. of Oracle Ridge Reeder & Reeder 6842-S₁. $2n = 36$ (as 18 bivalents): Gila Co., AZ, Fossil Creek Canyon, Miller 870; Maricopa Co., AZ, Roosevelt Dam, Miller 800. $2n = 60$ (as 30 bivalents): Guatemala, Departamento Totonicapán, Sierra Madre near San Cristobal Totonicapán, Miller 759, 760.

Claytonia parviflora Hook. $2n = 12$ (as 6 bivalents): U.S.A., Fresno Co., CA, ne. of Trimmer, Miller 767-S₁. $2n = 36$ (as 18 bivalents): Eldorado Co., CA, Middle Fork American River Canyon near Auburn, Miller 737.

The discovery of additional stations for diploid *C. perfoliata* in the mountains of southeastern Arizona, Guadalupe Island, and Queretaro was predictable on the basis of morphology. These collections possessed deltoid and mucronate mature basal leaves, a feature characteristic of diploids reported in earlier work. On the other hand, the existence of one population of decaploids in the Guatemalan Highlands is surprising in view of its phylogeographic position at the southern limit of the species. Other populations of *C. perfoliata* are known from Guatemala including those indigenous to the limestone Cordillera de los Cuchumatanes and volcanic Sierra Madre (Standley and Steyermark, Fieldiana (Botany) 24:209–210, 1945), although the chromosome number of these populations is unknown. Both Guatemalan collections and one from Volcan Tacaná, Chiapas, exhibited typical diploid basal leaf morphology. Decaploids referable to *C. perfoliata* have been reported from central Oregon and the Columbia River Gorge (Miller, Syst. Bot. 1:20–34, 1976). Long distance dispersal of seed from Oregon to the Guatemalan Highlands is unlikely. A more plausible hypothesis would be thousands of years of self-fertilization in the Guatemalan plants incorporating fusion of unreduced gametes.

Diploids and putative autopolyploids of *C. perfoliata* may now be viewed as constituting a series of disjunct populations spanning the west American cordillera from the California Coast, Transverse, and Peninsular Ranges (including the Channel Islands), through isolated pockets in the mountains of the Sonoran Desert, to the Sierra Madre Occidental, Trans Mexican Volcanic Belt, and Guatemalan Highlands. This phylogeographic pattern is consistent with a hypothetical Pliocene or early Pleistocene occurrence of continuous diploid populations that fluctuated in size during alternating arid and fluvial climates. This view does not explain the distribution of diploid *C. perfoliata* on the volcanic, oceanic Isla Guadalupe. Unlike the Channel Islands of California, Guadalupe Island was probably not connected to the mainland of Mexico. Therefore seed of diploid *C. perfoliata* was probably dispersed to the island by birds or man. I thank Reid Moran, Robert Ornduff, and John and Charlotte Reeder for

collecting seed and the American Philosophical Society for financing a collecting trip to Guatemala. The National Science Foundation (DEB 76-06048) provided additional travel money that made this project feasible.—JOHN M. MILLER, Department of Biology, Sul Ross State University, Alpine, TX 79832. (Received 17 Sep 82; accepted 16 Feb 83.)

NOTES ON THE MENTOR EFFECT AND MALE STERILITY IN *Malacothrix* (ASTERACEAE).—During biosystematic studies in *Malacothrix* (Lactuceae) plants resulting from interspecific crosses have been grown in cultivation, and most of them have been judged to be hybrid because they have had intermediate morphology, abnormalities in meiosis, and low percentages of stainable pollen. In a few such crosses plants were produced that were morphologically like the female parent rather than hybrid in appearance, even in cases where the female parent had been found to be self-incompatible. Apparently, the presence of foreign compatible pollen had allowed the self-incompatibility mechanism to be bypassed, a phenomenon known as the mentor effect (D. de Nettancourt, *Incompatibility in Angiosperms*, p. 70, 1977). This effect has been found in a variety of angiosperm families, including Asteraceae, and I have observed it in four self-incompatible species of *Malacothrix*. One interesting case concerns the bringing together of recessive male sterility alleles by the mentor effect, the first report of such alleles in *Malacothrix*. Crosses between plants of *M. floccifera* (DC.) Blake and *M. phaeocarpa* Davis (ined.) were involved. The former is a small, white-flowered annual that is widely distributed within the California Floristic Province, and the latter is a rarely collected, white-flowered, annual species that is presently known from only 16 populations in the southwestern portion of the range of *M. floccifera*. Twenty-four plants of *M. floccifera* representing three natural populations were grown in cultivation and all were self-incompatible. Ten plants of *M. phaeocarpa* from one population were grown in cultivation and all were autogamous and strongly self-pollinating, as evidenced from fruit set in undisturbed heads. Crosses between the two species with *M. floccifera* as the female parent were generally unsuccessful, but six hybrid plants were produced and all had stainable pollen of less than 5% and meiotic irregularities including a ring of four chromosomes. A seventh plant, which is assumed to have resulted from self-fertilization, had the morphology of *M. floccifera* and was found to have no pollen. A few stained protoplasts without nuclei were found after 24 hr of staining with 1% cotton blue-lactophenol and spore wall development had not taken place. Meiosis in the plant was visibly normal and seven bivalents were present at diakinesis. Regular first and second division segregation occurred and four, normal-appearing, nucleated cells enclosed within the PMC wall were produced. Gametophytic breakdown apparently occurred beyond this stage. The male sterile plant was used as the female parent in the crosses indicated below, which also include the original P-1 crosses (garden numbers for individual plants are given in parentheses; the female parent is on the left in each cross).

P-1	<i>M. floccifera</i> × <i>M. phaeocarpa</i>		<i>M. floccifera</i> × <i>M. floccifera</i>	
	(515-3)	↓	(592-3)	(515-1) ↓ (515-3)
F-1	Male Sterile	×		<i>M. floccifera</i>
	(618-1B)	↓		(665-1)
F-2	Male fertile (723-1A) 98% stainable pollen			
	Male sterile (723-1B) No pollen			
	Male sterile (723-1C) No pollen			